L1 ANSWER 1 OF 1 CAPLUS COPYRIGHT 2003 ACS
AN 1995:234781 CAPLUS
DN 122:12043
TI Biologically degradable synthetic conjugate fibers and nonwoven fabrics from them
IN Mochizuki, Masatsugu; Kan, Yoshihiro; Takahashi, Shuji; Inagaki, Koji
PA Unitika Ltd, Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM D04H001-54
ICS D04H001-54; D01D005-253; D01D005-34; D01F008-14; D02G001-00; D02G003-02; D04H001-46
CC 40-2 (Textiles and Fibers)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06212548	A2	19940802	JP 1993-22108	19930113 <--
	JP 3247177	B2	20020115		
PRAI	JP 1993-22108		19930113		

AB The nonwovens comprise conjugate fibers consisting of a core comprising biol. degradable thermoplastic polymers (e.g., aliph. polyesters or aliph. polyester-polyamides) with high melting temp. and a sheath component comprising biolog. degradable thermoplastic polymers having m.p. smaller than the m.p. of the core polymer and having no. of crimps .gtoreq.25/25 mm and are heat-bonded. Poly(ethylene succinate) with m.p. 102.degree. as the sheath and poly(butylene succinate) with m.p. 118.degree. as the core were together melt spun at 1:1 wt. ratio, lubricated, drawn, crimped in a stuffing box, cut, made into a carded web, and calendered at roll temp. 85.degree. in the relaxed state to give a nonwoven fabric with tensile strength in the machine and transverse directions 10.9 and 7.2 kg/5 cm, resp., and exhibiting excellent degrdn. on embedding the web in soil for 2 mo.
ST polyester conjugate fiber biolog degradable; nonwoven polyester conjugate fiber biolog degradable; polyethylene succinate conjugate fiber biolog degradable; polybutylene succinate conjugate fiber biolog degradable
IT Polyester fibers, uses
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(bicomponent; biol. degradable synthetic conjugate fibers and nonwoven fabrics from them)
IT Synthetic fibers, polymeric
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(bicomponent; biol. degradable synthetic fibers and nonwoven fabrics from them)
IT Biodegradable materials
(synthetic conjugate fibers and nonwoven fabrics from them)
IT Polyester fibers, uses
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyamide-, bicomponent; biol. degradable synthetic fibers and nonwoven fabrics from them)
IT Polyamide fibers, uses
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyester-, bicomponent; biol. degradable synthetic fibers and nonwoven fabrics from them)
IT 25569-53-3P, Poly(ethylene succinate) 25667-11-2P, Poly(ethylene succinate) 26247-20-1P, Poly(butylene succinate) 49721-13-3P
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(bicomponent with poly(butylene succinate) fibers; biol. degradable synthetic conjugate fibers and nonwoven fabrics from them)

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **06-212548**
(43)Date of publication of application : **02.08.1994**

(51)Int.CI. **D04H 1/54**
D04H 1/54
D01D 5/253
D01D 5/34
D01F 8/14
D02G 1/00
D02G 3/02
D04H 1/46

(21)Application number : **05-022108**
(22)Date of filing : **13.01.1993**

(71)Applicant : **UNITIKA LTD**
(72)Inventor : **MOCHIZUKI MASATSUGU**
KAN YOSHIHIRO
TAKAHASHI SHUJI
INAGAKI KOJI

(54) BIODEGRADABLE LATENT-CRIMPING CONJUGATE SHORT FIBER AND ITS NONWOVEN FABRIC

(57)Abstract:
PURPOSE: To provide biodegradable nonwoven fabric having excellent mechanical strength, dimensional stability, stretchability, bulkiness, flexibility and hot- bonding performance and suitable as a raw material for hygienic material and life-relating material.
CONSTITUTION: The objective fiber is a biodegradable latent-crimping eccentric core-sheath conjugate short fiber having a core part composed of a biodegradable thermoplastic polymer component having high melting point and a sheath part composed of a biodegradable thermoplastic polymer component having a melting point lower than that of the core part. As an alternative, the conjugate fiber is a biodegradable latent-crimping side-by-side conjugate short fiber produced by bonding a biodegradable thermoplastic polymer component having high melting point to a biodegradable thermoplastic polymer component having low melting point in side-by-side state. The nonwoven fabric is composed of conjugate short fibers having a crimp number of >25/25mm and partly heat- bonded or three-dimensionally interlocked with each other.

LEGAL STATUS

[Date of request for examination]	06.01.2000
[Date of sending the examiner's decision of rejection]	05.06.2001
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3247177
[Date of registration]	02.11.2001
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

CLAIMS

[Claim(s)]

[Claim 1] The biodegradability potential crimp nature compound staple fiber which is an eccentric sheath-core type compound staple fiber with which a core part consists of a biodegradability thermoplasticity polymer component of a high-melting point, and the sheath section consists of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer, and is characterized by having potential crimp ability.

[Claim 2] The biodegradability potential crimp nature compound staple fiber which is a lamination type compound staple fiber with which it comes to join the biodegradability thermoplasticity polymer component of a high-melting point, and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] to a lamination type, and is characterized by having potential crimp ability.

[Claim 3] The nonwoven fabric characterized by for a core part consisting of a biodegradability thermoplasticity polymer component of a high-melting point, and for the sheath section consisting of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer, and consisting of eccentric sheath-core type compound staple fibers which have 25 crimp numbers / crimp 25mm or more, and carrying out heat adhesion of the composition fiber partially.

[Claim 4] The nonwoven fabric characterized by consisting of lamination type compound staple fibers which it comes to join the biodegradability thermoplasticity polymer component of a high-melting point, and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] to a lamination type, and have 25 crimp numbers / crimp 25mm or more, and carrying out heat adhesion of the composition fiber partially.

[Claim 5] The nonwoven fabric to which a core part consists of a biodegradability thermoplasticity polymer component of a high-melting point, the sheath section consists of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer, and consists of eccentric sheath-core type compound staple fibers which have 25 crimp numbers / crimp 25mm or more, and composition fiber is characterized by carrying out the confounding in three dimensions.

[Claim 6] The nonwoven fabric to which it consists of lamination type compound staple fibers which it comes to join the biodegradability thermoplasticity polymer component of a high-melting point, and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] to a lamination type, and have 25 crimp numbers / crimp 25mm or more, and composition fiber is characterized by carrying out the confounding in three dimensions.

[Claim 7] The biodegradability potential crimp nature compound staple fiber according to claim 1 or 2 with which a biodegradability thermoplasticity polymer is characterized by being an aliphatic polyester system polymer or an aliphatic polyester amide system copolymer.

[Claim 8] The nonwoven fabric according to claim 3, 4, 5, or 6 to which a biodegradability thermoplasticity polymer is characterized by being an aliphatic polyester system polymer or an aliphatic polyester amide system copolymer.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention has biodegradability, and a mechanical strength, dimensional stability, elasticity, and a loft are excellent, it is rich in flexibility, and relates to a suitable compound [to obtain the nonwoven fabric which moreover has a heat adhesive property] staple fiber, and its nonwoven fabric.
[0002]
[Description of the Prior Art] From the former, various biodegradability nonwoven fabrics, such as a nonwoven fabric which consists of a chemical fiber of natural products, such as a viscose-rayon staple-fiber nonwoven fabric obtained by dry process or solution dip coating, a cuprammonium rayon rayon continuous-glass-fiber nonwoven fabric obtained by the wet span bond method, a viscose-rayon continuous-glass-fiber nonwoven fabric, a chitin, and atelocollagen, and a span race nonwoven fabric which consists of a cotton, are known. However, since the mechanical strength of the constituent material of a nonwoven fabric itself was low and the biodegradability nonwoven fabric of these former had it, moreover contraction is large and dimensional stability was inferior at the time of dryness with the remarkable mechanical-strength fall at the time of water absorption and humidity, and a humid repeat, since the material itself was [which it is inferior in flexibility] non-thermoplasticity further, it had various problems, such as not having a heat adhesive property. [hydrophilic]
[0003]
[Problem(s) to be Solved by the Invention] this invention solves the aforementioned problem, and has biodegradability, and a mechanical strength, dimensional stability, elasticity, and a loft tend to be excellent, it tends to be rich in flexibility, and tends to offer a suitable compound [to obtain the nonwoven fabric which moreover has a heat adhesive property] staple fiber, and its nonwoven fabric.
[0004]
[Means for Solving the Problem] This invention persons reached this invention wholeheartedly as a result of examination that the aforementioned problem should be solved. That is, this invention makes a summary the biodegradability potential crimp nature compound staple fiber which is an eccentric sheath-core type compound staple fiber with which a core part consists of a biodegradability thermoplasticity polymer component of a high-melting point, and the sheath section consists of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer, and is characterized by having potential crimp ability. Moreover, this invention makes a summary the biodegradability potential crimp nature compound staple fiber characterized by being the lamination type compound staple fiber with which it comes to join the biodegradability thermoplasticity polymer component of a high-melting point, and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] to a lamination type, and having potential crimp ability. Moreover, this invention makes a summary the nonwoven fabric characterized by for a core part consisting of a biodegradability thermoplasticity polymer component of a high-melting point, and for the sheath section consisting of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer, and consisting of eccentric sheath-core type compound staple fibers which have 25 crimp numbers / crimp 25mm or more, and carrying out heat adhesion of the composition fiber partially. Moreover, this invention makes a summary the nonwoven fabric characterized by consisting of lamination type compound staple fibers which it comes to join the biodegradability thermoplasticity polymer component of a high-melting point, and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] to a lamination type, and have 25 crimp numbers / crimp 25mm or more, and carrying out heat adhesion of the composition fiber partially. Furthermore, this invention makes a summary the nonwoven fabric to which a core part is characterized by carrying out the confounding in [consist of eccentric sheath-core type compound staple fibers which consist of a biodegradability thermoplasticity polymer component of a high-melting point, consist of a biodegradability thermoplasticity polymer component of the low melting point / section / sheath / polymer / aforementioned], and have 25 crimp numbers / crimp 25mm or more, and / composition fiber / three dimensions. Furthermore, let the nonwoven fabric to which, as for this invention, the biodegradability thermoplasticity polymer component of a high-melting point and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] are characterized by carrying out the confounding in / consist of lamination type compound staple fibers which it comes to join to a lamination type and have 25 crimp numbers / crimp 25mm or more, and / composition fiber / three dimensions be a summary.
[0005] Next, this invention is explained in detail. With the biodegradability thermoplasticity polymer in this invention It is the

thermoplastic aliphatic polyester system polymer which has biodegradability. for example The polymers which consist of the polyglycol acid and polylactic acid like poly (alpha-hydroxy acid), or these copolymers Moreover, poly (epsilon-caprolactone), Poly Poly like a (beta propiolactone) (omega-hydroxy alkanoate) further Polly 3-hydroxy propionate, Polly 3-hydroxy butyrate, a Polly 3-hydroxy KAPURO rate, Polly 3-hydroxy heptanoate, Polly 3-hydroxy octanoate And poly (beta-hydroxy alkanoate) like the copolymer of these, and a Polly 3-hydroxy barricade rate and Polly 4-hydroxy butyrate is mentioned. Moreover, as what consists of a condensation polymerization object of a glycol and a dicarboxylic acid, for example, a polyethylene OKISA rate, polyethylene succinate, a polyethylene horse mackerel peat, polyethylene azelate, a polybutylene OKISA rate, polybutylene succinate, a polybutylene horse mackerel peat, polybutylene sebacate, polyhexamethylene sebacate, poly neopentyl OKISA rates, or these copolymers are mentioned. Furthermore, the aliphatic polyester amide system copolymer which is ****** coalesce with the aforementioned aliphatic polyester and an aliphatic polyamide like polycapramide (nylon 6), polytetra ethylene adipamide (Nylon 46), a polyhexamethylene adipamide (Nylon 66), poly undeca NAMIDO (Nylon 11), and poly RAURORAKUTAMIDO (Nylon 12) is mentioned. In this invention, if it has biodegradability even if it is a thermoplastic polymer except having mentioned above as a thermoplastic polymer which has biodegradability, it can use. In addition, it responds to the thermoplastic polymer which has the biodegradability mentioned above in this invention at the need, for example, is a book about various additives, such as a flatting, a pigment, a light stabilizer, a thermostabilizer, and an antioxidant.

[0006] The compound staple fiber which consists of a thermoplastic polymer which has the aforementioned biodegradability in this invention It is what consists of 3 degrees C or more and two sorts of polymer components in which it differs 150 degrees C or less in the melting point chosen from from among the aforementioned polymers. So that it may have the eccentric sheath-core type compound gestalt to which both the aforementioned polymers component was allotted so that a core part might consist of a biodegradability thermoplasticity polymer component of a high-melting point and the sheath section might consist of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer Or it is joined so that the biodegradability thermoplasticity polymer component of a high-melting point and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] may have a lamination type compound gestalt, and moreover, it has potential crimp ability. In order that a nonwoven web may be produced using the fiber obtained in this compound staple fiber as the melting point difference of both the aforementioned polymers component is less than 3 degrees C, it may face heat-treating to this and considering as a nonwoven fabric and not only the polymer component of the low melting point but the polymer component of a high-melting point may carry out softening fusion, it is not desirable, therefore in this invention, the 5 degrees C or more of the 3 degrees C or more of the aforementioned melting point differences are preferably made into 10 degrees C or more still more preferably. if the aforementioned melting point difference exceeds 150 degrees C on the other hand -- the melting point difference of both the polymers component -- not much -- being also alike -- since it faces carrying out compound spinning using both polymers since it differs greatly and control of spinning temperature becomes difficult in a spinning nozzle pack, it is not desirable In addition, in this invention, when 80 degrees C or more of things 100 degrees C or more were adopted still more preferably preferably [60 degrees C or more of melting points] as a biodegradability thermoplasticity polymer of the aforementioned low melting point and it considers as a nonwoven fabric using the staple fiber which has this polymer component of the low melting point, a nonwoven fabric can be made to possess fixed thermal resistance, and it is desirable. In this compound staple fiber, it is good to set a compound ratio, i.e., the weight ratio of the polymer component of the low melting point to the polymer component of a high-melting point, to 1 / 5 - 5/1. As opposed to the polymer component 1 of a high-melting point the ratio of the polymer component of the low melting point 5 Since the intensity of a staple fiber falls, or the elasticity and loft of a nonwoven fabric which are obtained using this staple fiber are inferior, or a nonwoven fabric will become hard and feeling will get worse, if it exceeds, Since an on-the-strength fall is produced or the nonwoven fabric obtained on the other hand using this staple fiber to the polymer component 5 of a high-melting point as the ratio of the polymer component of the low melting point is less than one is inferior in the elasticity and loft of a nonwoven fabric in heat jointing between the composition fiber, any -- not desirable -- therefore, this invention -- setting -- the aforementioned compound ratio -- 1 / 5 - 5/1 -- it is preferably referred to as 2 / 3 - 3/2

[0007] It is what this compound staple fiber is joined so that the polymer component of a high-melting point and the polymer component of the low melting point may have an eccentric sheath-core type compound gestalt or a lamination type compound gestalt, as mentioned above, and has potential crimp ability. It is, and if relaxing heat processing is performed at the temperature near the melting point of the thermoplastic polymer component of the aforementioned low melting point and a potential crimp is actualized by having such a compound gestalt, 25 crimp numbers / crimp 25mm or more will be discovered. Therefore, when it considers as a nonwoven fabric using the staple fiber with which this potential crimp was actualized, the nonwoven fabric can be made to possess elasticity and a loft.

[0008] The aforementioned compound staple fiber in this invention is that the single fiber fineness of whose is 1.0-20 deniers. It faces creating a card web as it is and single fiber fineness is less than 1.0 deniers. the nonwoven fabric which will be obtained using this staple fiber if ** card permeability is inferior, or the web obtained using this staple fiber becomes what has many spots and single fiber fineness exceeds 20 deniers on the other hand -- rough -- since it becomes the coarse thing of **** conditions and the grace is inferior, neither is desirable

[0009] The nonwoven fabric in this invention consists of aforementioned compound staple fibers which the potential crimp mentioned above was actualized and 25 crimp numbers / crimp 25mm or more discovered, and heat adhesion of the composition fiber is carried out partially, and it consists of compound staple fibers which the aforementioned crimp discovered, and the confounding of the composition fiber is carried out in three dimensions. Since composition fiber itself has 25 crimp numbers /

crimp 25mm or more, this nonwoven fabric possesses the outstanding elasticity and the outstanding loft. Moreover, this nonwoven fabric is that by which the point pasting [partial heat] up is formed between composition fiber of well-known heat adhesion processing. It is that by which it is and the three-dimensions-confounding is formed between composition fiber of the so-called well-known high-pressure liquid style processing. It is, the gestalt as a nonwoven fabric is held by these partial heat adhesion or the three-dimensions-confounding, the mechanical strength and dimensional stability which were moreover excellent in the nonwoven fabric are discovered, and the flexibility which was excellent in the nonwoven fabric with especially the three-dimensions-confounding is discovered.

[0010] As for the nonwoven fabric which consists of the aforementioned compound staple fiber in this invention, it is desirable that the superintendent officer is a two or more 10 g/m thing. It sets to this nonwoven fabric and a superintendent officer is 10 g/m2. The intensity of the nonwoven fabric itself is low in it being the following, and since the grace -- the conditions of a nonwoven fabric become coarse -- is inferior, or it faces creating a nonwoven fabric, and handling nature is inferior and the productivity falls, it is not desirable.

[0011] The aforementioned staple fiber in this invention can be efficiently manufactured by the following methods. By the conventional method, namely, biodegradability The melting point chosen from from among the aforementioned thermoplastic polymers which it has 3 degrees C or more and two sorts of polymers in which it differs 150 degrees C or less It continues without once rolling round, and considering as a non-extended continuous-glass-fiber line of thread, or once rolling round, after carrying out melting compound spinning at an eccentric sheath-core type or a lamination type and cooling a spinning line of thread using a cooling air style or cooling water. After giving this a cold stretch or hot-rolling growth in one step or two steps or more, using a stuffing box for the obtained extension continuous-glass-fiber line of thread and giving a predetermined machine crimp, or after heating contraction processing gives a predetermined crimp, it can obtain by cutting to predetermined length.

[0012] Although the spinning temperature for melting spinning is based on the melting point and polymerization degree of the polymer to be used, it is desirable to usually consider as 120-300 degrees C. If the melting extrusion of a polymer becomes difficult for spinning temperature to be less than 120 degrees C and spinning temperature exceeds 300 degrees C on the other hand, the pyrolysis of a polymer cannot become remarkable, and the fiber of high intensity cannot be obtained, but neither is desirable. Although all the draw magnification for extending to a non-extended continuous-glass-fiber line of thread is based on the intensity level of the staple fiber made into the purpose, it can usually be made into 2.0 to 4.0 times, and can obtain the staple fiber which has the tensile strength of 3.0g/denier or more by this.

[0013] The nonwoven fabric which consists of the aforementioned staple fiber in this invention can be efficiently manufactured by the so-called well-known staple-fiber method. Namely, after extending after carrying out melting compound spinning of 3 degrees C or more and two sorts of polymers in which it differs 150 degrees C or less for the melting point chosen from from among the aforementioned thermoplastic polymers which have biodegradability and cooling a spinning line of thread by the conventional method, and giving a predetermined crimp to the obtained extension continuous-glass-fiber line of thread, it cuts to predetermined length. Consider as a staple fiber, make into a raw cotton the staple fiber subsequently obtained, and carding is carried out using a carding machine. After creating a card web, performing heat adhesion processing to the obtained card web and carrying out heat adhesion of the composition fiber partially, it can obtain by performing relaxing heat processing and actualizing the potential crimp of composition fiber. Or after performing high-pressure liquid style processing to the obtained card web and carrying out the confounding of the composition fiber in three dimensions, it can obtain by performing relaxing heat processing and actualizing the potential crimp of composition fiber.

[0014] It faces performing partial heat adhesion processing to a web, and a well-known method can be adopted. For example, they are the method of letting it pass between the embossing roller which had the web heated, and the roller with which a front face consists of a smooth metal roller etc., a method using a direct drying equipment, or a method using ultrasonic weld equipment. The heated embossing roller The fiber which use and exist in the embossing pattern section When carrying out heat adhesion partially, the rate of pressure-welding area of an embossing roller If cannot consider as 5 - 50%, and there are few punctiform weld zones, and the mechanical strength of a nonwoven fabric cannot fall that this rate of pressure-welding area is less than 5%, good dimensional stability cannot be obtained but this rate of pressure-welding area exceeds 50% on the other hand, a nonwoven fabric gets stiff, flexibility is spoiled and neither is desirable. Moreover, it is good to usually make about 5-50 degrees C [melting point / of the thermoplastic polymer of the aforementioned low melting point] of roller temperature into low temperature, and the adhesive strength between fiber is high by choosing this temperature suitably, namely, a mechanical strength and dimensional stability are excellent, and the nonwoven fabric which is moreover rich in flexibility can be obtained. The embossing pattern in the case of using a heat embossing roller is not limited especially if the rate of pressure-welding area is within the limits which is 5 - 50%, and it is good in arbitrary configurations, such as a round shape, an elliptic type, a ** type, a trigonum type, a T character type, and a ** type. Moreover, although processing temperature is depended also on the processing time when carrying out heat adhesion of the fiber partially by the crossover site of fiber using a direct drying equipment, it is usually better than the melting point of beyond the melting point of the thermoplastic polymer of the aforementioned low melting point, and the thermoplastic polymer of a high-melting point to make about 10 degrees C into low temperature. In addition, the partial heat adhesion processing using for example, these heat embossing rollers, a direct drying equipment, or ultrasonic weld equipment may be any of a continuous process or another process.

[0015] It faces performing high-pressure liquid style processing to a web, and a well-known method can be adopted. For example, there is a way an injection pressure injects the high-pressure liquid of 5 - 150 kg/cm2 G from the aforementioned nozzle, using the equipment with which the aperture arranged especially many nozzles which are 0.1-0.4mm 0.05-1.0mm. The

array of a nozzle is arranged in the direction which intersects perpendicularly with the travelling direction of a web at a seriate. Although you may give any of one side of a web, or both sides, if this processing processes by arranging a nozzle in two or more trains, and making an injection pressure it being low and high on a preceding paragraph story on a latter-part story, in one side processing, it can obtain especially the nonwoven fabric which has a uniform and precise confounding gestalt and uniform conditions. As a high-pressure liquid, it is common to use water or warm water. As for the distance between a nozzle and a web, it is good to be referred to as 1-15cm. If the conditions of a web are confused as this distance is less than 1cm, and this distance exceeds 15cm on the other hand, impulse force when a liquid style collides with a web declines, and a three-dimensions-confounding is not fully given, but neither is desirable. This high-pressure liquid style processing may be any of a continuous process or another process. After performing high-pressure liquid style processing, superfluous moisture is removed from a web. It faces removing this superfluous moisture and a well-known method can be adopted. For example, superfluous moisture is removed to some extent using beam limiting devices, such as a mangle roll, and residual moisture is succeedingly removed using dryers, such as a continuation hot air drying equipment.

[0016] It makes it face to perform relaxing heat processing to a web and to actualize the potential crimp of composition fiber, and a well-known method can be adopted. For example, it is the method of performing relaxing heat processing to a web using heating apparatus, such as a direct drying equipment. Although processing temperature is depended also on the processing time when performing relaxing heat processing to a web using a direct drying equipment, it is usually better than the melting point of the thermoplastic polymer of the aforementioned low melting point to make about 5-30 degrees C into low temperature. In addition, the relaxing heat processing using this direct drying equipment may be any of a continuous process or another process.

[0017]

[Example] Next, although this invention is concretely explained based on an example, this invention is not limited at all by these examples. In the example, each weighted solidity was measured by the following method.

Melting point (degree C): Temperature which measures the condition for 20 degrees-C/of programming rates, and gives extremal value in the obtained dissolution endothermic curve was made into the melting point using the differential scan type calorimeter DSC[by PerkinElmer, Inc.]-2 type.

Melt-flow-rate value (g / 10 minutes): ASTM According to the method of a publication, it measured to D1238 (L).

Tensile strength of a staple fiber (g/denier): According to the method of a publication, it measured to JIS-L -1013.

According to the method of a publication, it measured to KGSM **** powerful (kg):JIS-L-1096A of a nonwoven fabric. Namely, it is the average of a load value (kg) at the time of cutting which created ten test pieces whose sample width of face sample length is 10cm and is 5cm, developed by part for 10cm/of speeds of testing about lengthwise [of a nonwoven fabric] using the constant-rate-of-extension type tension tester (Oriental Baldwin tensilon UTM- 4 -1 -100) for every test piece, and was obtained Superintendent officer 100 g/m2 It converts into a hit. KGSM **** -- powerful -- it could be (kg)

The number of crimps of nonwoven-fabric composition fiber (an individual / 25mm): The enlargement of nonwoven fabric composition fiber was taken using the scanning electron microscope, and it asked for the number of crimps.

[0018] the polybutylene succinate polymer whose melting points a melt-flow-rate value is the low melting point component of the sheath section, and are 5g / 10 minutes at 118 degrees C about the polyethylene succinate polymer whose melt-flow-rate values the example 1 melting point is 5g / 10 minutes at 102 degrees C -- the high-melting point component of a core part -- carrying out -- both [these] polymers -- fusing -- the compound spinning of 0.5mm of apertures -- let the spinneret which **** a hole 36 times pass After it carried out melting compound spinning at the eccentric sheath-core type on condition that the spinning temperature of 230 degrees C, and the compound ratios (weight ratio) 1/1 and temperature cooled the spinning line of thread using the cooling air style which is 20 degrees C, the oily medicine was given, it once rolled round by part for 1000m/in winding speed, and the non-extended line of thread was obtained. Subsequently, one-step hot-rolling growth was given using the heating roller with a temperature of 60 degrees C, having used all draw magnification as 3.8 at the obtained non-extended line of thread, the stuffing box was used for the obtained extension line of thread, 18 pieces / 25mm machine crimp was given, it cut in length of 51mm, and the cotton of the eccentric sheath-core type compound staple fiber whose single fiber fineness is 2.0 deniers was obtained. ******** was 3.9g/denier and the obtained compound staple fiber was what has practically sufficient mechanical strength. Moreover, after laying this staple fiber underground into two-month soil insulation, when it took out and observed, the gestalt as fiber was disappeared and having had the outstanding biodegradability was admitted.

[0019] the polybutylene succinate polymer whose melting points a melt-flow-rate value is a low melting point component, and are 5g / 10 minutes at 118 degrees C about the polyethylene succinate polymer whose melt-flow-rate values the example 2 melting point is 10g / 10 minutes at 102 degrees C -- a high-melting point component -- carrying out -- both [these] polymers -- fusing -- the lamination type (side by side type) compound spinning of 0.6mm of apertures -- let the spinneret which **** a hole 36 times pass After it carried out melting compound spinning at the lamination type on condition that the spinning temperature of 205 degrees C, and the compound ratios (weight ratio) 1/1 and temperature cooled the spinning line of thread using ******** which is 40 degrees C, the oily medicine was given, it once rolled round by part for 800m/in winding speed, and the non-extended line of thread was obtained. Subsequently, one-step hot-rolling growth was given using the heating roller with a temperature of 60 degrees C, having used all draw magnification as 3.8 at the obtained non-extended line of thread, the stuffing box was used for the obtained extension line of thread, 18 pieces / 25mm machine crimp was given, it cut in length of 51mm, and the cotton of the lamination type compound staple fiber whose single fiber fineness is 3.0 deniers was obtained. ******** was 3.6g/denier and the obtained compound staple fiber was what has practically sufficient mechanical strength. Moreover, after laying this staple fiber underground into two-month soil insulation, when it took out and observed, the gestalt as fiber was disappeared and having had

the outstanding biodegradability was admitted.
[0020] Make into a raw cotton the aforementioned staple-fiber cotton obtained in the example 3 example 1, and carry out carding using a carding machine. A superintendent officer is 38g/m2. After having created the card web, temperature's having been heated by 85 degrees C, and letting the obtained card web pass between the embossing roll whose rate of pressure-welding area is 18%, and the smooth roll of this temperature and carrying out heat adhesion of the fiber partially, relaxing heat processing was performed using the direct drying equipment whose temperature is 90 degrees C, and the nonwoven fabric was obtained. KGSM ******** is [10.9kg of lengthwise, 5cm, 7.2kg of longitudinal directions, 5cm, and the number of crimps] 35 pieces / 25mm, and the obtained nonwoven fabric was excellent in a mechanical strength, dimensional stability, elasticity, and the loft. Moreover, after laying this nonwoven fabric underground into two-month soil insulation, when it took out and observed, the gestalt as a nonwoven fabric was disappeared and having had the outstanding biodegradability was admitted.
[0021] Make into a raw cotton the aforementioned staple-fiber cotton obtained in the example 4 example 2, and carry out carding using a carding machine. A superintendent officer is 30g/m2. After having created the card web, temperature's having been heated by 90 degrees C, and letting the obtained card web pass between the embossing roll whose rate of pressure-welding area is 18%, and the smooth roll of this temperature and carrying out heat adhesion of the fiber partially, relaxing heat processing was performed using the direct drying equipment whose temperature is 95 degrees C, and the nonwoven fabric was obtained. KGSM ******** of the obtained nonwoven fabric was what 10.6kg of lengthwise, 5cm, 7.1kg of longitudinal directions, 5cm, and the number of crimps are 35 pieces / 25mm, and a mechanical strength, dimensional stability, elasticity, and a loft are excellent in, and is moreover rich in flexibility. Moreover, after laying this nonwoven fabric underground into two-month soil insulation, when it took out and observed, the gestalt as a nonwoven fabric was disappeared and having had the outstanding biodegradability was admitted.
[0022] The aforementioned staple-fiber cotton obtained in the example 5 example 1 is made into a raw cotton, carding is carried out using a carding machine, and a superintendent officer is 38 g/m2. The card web was created, the obtained card web was laid on the wire gauze of 80 meshes, high-pressure liquid style processing was performed, and the confounding of the composition fiber was carried out in three dimensions. The nozzle of 0.12mm of apertures made the pillar-shaped stream act from the upper part of a web on condition that water pressure 65 kg/cm2 as high-pressure liquid style processing using the high-pressure pillar-shaped stream processor arranged in 3 group array by 0.6mm of spacing. In addition, this processing was respectively performed 3 times from the front reverse side of a web. Subsequently, after removing superfluous moisture from the obtained processing web using a mangle roll, while using a hot air drying equipment for a web, performing dryness processing on conditions with a temperature of 75 degrees C and carrying out heat adhesion of the fiber partially using the direct drying equipment whose temperature is 108 degrees C further, relaxing heat processing was performed, and the nonwoven fabric was obtained. KGSM ******** of the obtained nonwoven fabric was what 12.1kg of lengthwise, 5cm, 8.3kg of longitudinal directions, 5cm, and the number of crimps are 37 pieces / 25mm, and a mechanical strength, dimensional stability, elasticity, and a loft are excellent in, and is moreover rich in flexibility. Moreover, after laying this nonwoven fabric underground into two-month soil insulation, when it took out and observed, the form as a nonwoven fabric was disappeared and having had the outstanding biodegradability was admitted.
[0023]
[Effect of the Invention] The biodegradability potential crimp nature compound staple fiber of this invention the eccentric sheath-core type compound gestalt to which both the aforementioned polymers component was allotted so that a core part might consist of a biodegradability thermoplasticity polymer component of a high-melting point and the sheath section might consist of a biodegradability thermoplasticity polymer component of the low melting point from the aforementioned polymer It is joined so that the biodegradability thermoplasticity polymer component of a high-melting point and the biodegradability thermoplasticity polymer component of the low melting point [polymer / aforementioned] may have a lamination type compound gestalt, and, moreover, has potential crimp ability so that it may have. It is suitable to obtain the nonwoven fabric which exists, has biodegradability, a mechanical strength, dimensional stability, elasticity, and a loft are excellent in, is rich in flexibility, and moreover has a heat adhesive property. And the nonwoven fabric which comes to use this compound staple fiber has an outstanding property which was mentioned above, and is suitable as materials for life related material, such as a base fabric of materials for hygienic goods, such as a diaper and sanitary items, a disposable steamed towel, or a wiping cross and poultice material, and other for home use or business-use raw dust collection bag and waste treatment material. And this nonwoven fabric is useful also from a viewpoint of natural environment protection in order to carry out decomposition disappearance completely finally, if it is left in the inside of the environment, for example, soil, where many microorganisms exist after the use, or underwater, or since it can also aim at reuse, such as composting, for example and considering as fertilizer, it is useful also from a viewpoint of recycling of resources.

[Translation done.]